

## CLAIMS

1. A liquid crystal display comprising
- a) liquid crystal cell with rubbing directions of the top and bottom alignment layers that favor a twist angle of  $\pm 22 \pm 5^\circ$ ;
- 5 b) an input polarizer with an angle of  $\pm 45 \pm 5^\circ$  and an output polarizer at an angle of  $\pm 68 \pm 5^\circ$ ;
- c) a chiral dopant added to the liquid crystal such that ratio of the thickness of the cell and the pitch of the liquid crystal twist is between  $0.19 \pm 0.1$
- d) the thickness times the birefringence of the liquid cell being  $0.27 \pm 0.1 \mu\text{m}$ .
- 10 2. A liquid crystal display comprising
- a) liquid crystal cell with rubbing directions of the top and bottom alignment layers that favor a twist angle of  $\pm 22 \pm 5^\circ$ ;
- b) an input polarizer with an angle of  $\pm 45 \pm 5^\circ$  and an output polarizer at an angle
- 15 of  $\pm 68 \pm 5^\circ$ ;
- c) a chiral dopant added to the liquid crystal such that the ratio of the thickness of the cell and the pitch of the liquid crystal twist is between  $0.31 \pm 0.15$
- d) the thickness times the birefringence of the liquid cell being  $0.55 \pm 0.15 \mu\text{m}$ .
- 20 3. A liquid crystal display comprising
- a) liquid crystal cell with rubbing directions of the top and bottom alignment layers that favor a twist angle of  $\pm 68 \pm 5^\circ$ ;
- b) an input polarizer with an angle of  $\pm 45 \pm 5^\circ$  and an output polarizer at an angle of  $\pm 23 \pm 5^\circ$ ;

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- c) a chiral dopant added to the liquid crystal such that the ratio of the thickness of the cell and the pitch of the liquid crystal twist is between  $0.38 \pm 0.2$
- d) the thickness times the birefringence of the liquid cell being  $0.80 \pm 0.2 \mu\text{m}$ .
- 5 4. A liquid crystal display comprising
- a) liquid crystal cell with rubbing directions of the top and bottom alignment layers that favor a twist angle of  $112 \pm 5^\circ$ ;
- b) an input polarizer with an angle of  $\pm 45 \pm 5^\circ$  and an output polarizer at an angle of  $23 \pm 5^\circ$ ;
- 10 c) a chiral dopant added to the liquid crystal such that the ratio of the thickness of the cell and the pitch of the liquid crystal twist is between  $0.56 \pm 0.3$
- d) the thickness times the birefringence of the liquid cell being  $1.05 \pm 0.2 \mu\text{m}$ .
5. A liquid crystal display comprising
- 15 a) liquid crystal cell with rubbing directions of the top and bottom alignment layers that favor a twist angle of  $\pm 158 \pm 5^\circ$ ;
- b) an input polarizer with an angle of  $\pm 45 \pm 5^\circ$  and an output polarizer at an angle of  $\pm 68 \pm 5^\circ$ ;
- c) a chiral dopant added to the liquid crystal such that the ratio of the thickness
- 20 of the cell and the pitch of the liquid crystal twist is between  $0.69 \pm 0.3$
- d) the thickness times the birefringence of the liquid cell being  $1.3 \pm 0.3 \mu\text{m}$ .
6. A single polarizer reflective liquid crystal display comprising

a) liquid crystal cell with rubbing directions of the top and bottom alignment layers that favor a twist angle of  $\pm 174 \pm 5^\circ$ ;

b) an input polarizer with an angle of  $\pm 41 \pm 5^\circ$ ;

c) a chiral dopant added to the liquid crystal such that the ratio of the thickness  
5 of the cell and the pitch of the liquid crystal twist is between  $0.47 \pm 0.3$

d) the thickness times the birefringence of the liquid cell being  $0.14 \pm 0.2 \mu\text{m}$ .

7. A single polarizer reflective liquid crystal display comprising

a) liquid crystal cell with rubbing directions of the top and bottom alignment  
10 layers that favor a twist angle of  $\pm 133 \pm 5^\circ$ ;

b) an input polarizer with an angle of  $\pm 32 \pm 5^\circ$ ;

c) a chiral dopant added to the liquid crystal such that the ratio of the thickness  
of the cell and the pitch of the liquid crystal twist is between  $0.24 \pm 0.3$

d) the thickness times the birefringence of the liquid cell being  $0.14 \pm 0.2 \mu\text{m}$ .

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8. A single polarizer reflective liquid crystal display comprising

a) liquid crystal cell with rubbing directions of the top and bottom alignment  
layers that favor a twist angle of  $\pm 174 \pm 5^\circ$ ;

b) an input polarizer with an angle of  $\pm 13 \pm 5^\circ$ ;

c) a chiral dopant added to the liquid crystal such that the ratio of the thickness  
20 of the cell and the pitch of the liquid crystal twist is between  $0.47 \pm 0.3$ .

d) the thickness times the birefringence of the liquid cell being  $0.55 \pm 0.2 \mu\text{m}$ .

9. A single polarizer reflective liquid crystal display comprising

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a) liquid crystal cell with rubbing directions of the top and bottom alignment layers that favor a twist angle of  $\pm 294 \pm 5^\circ$ ;

b) an input polarizer with an angle of  $\pm 27 \pm 5^\circ$ ;

c) a chiral dopant added to the liquid crystal such that the ratio of the thickness  
5 of the cell and the pitch of the liquid crystal twist is between  $0.50 \pm 0.3$

d) the thickness times the birefringence of the liquid cell being  $0.6 \pm 0.2 \mu\text{m}$ .

10. A single polarizer reflective liquid crystal display comprising

a) liquid crystal cell with rubbing directions of the top and bottom alignment  
10 layers that favor a twist angle of  $\pm 107 \pm 5^\circ$ ;

b) an input polarizer with an angle of  $\pm 17 \pm 5^\circ$ ;

c) a chiral dopant added to the liquid crystal such that the ratio of the thickness  
of the cell and the pitch of the liquid crystal twist is between  $0.50 \pm 0.3$

d) the thickness times the birefringence of the liquid cell being  $0.27 \pm 0.2 \mu\text{m}$ .

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11. A single polarizer reflective liquid crystal display comprising

a) liquid crystal cell with rubbing directions of the top and bottom alignment  
layers that favor a twist angle of  $\pm 220 \pm 5^\circ$ ;

b) an input polarizer with an angle of  $\pm 35 \pm 5^\circ$ ;

c) a chiral dopant added to the liquid crystal such that the ratio of the thickness  
20 of the cell and the pitch of the liquid crystal twist is between  $0.50 \pm 0.3$

d) the thickness times the birefringence of the liquid cell being  $0.38 \pm 0.2 \mu\text{m}$ .

12. A single polarizer reflective liquid crystal display comprising

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- a) liquid crystal cell with rubbing directions of the top and bottom alignment layers that favor a twist angle of  $\pm 191 \pm 5^\circ$ ;
  - b) an input polarizer with an angle of  $\pm 0.4 \pm 5^\circ$ ;
  - c) a chiral dopant added to the liquid crystal such that the ratio of the thickness
  - 5 of the cell and the pitch of the liquid crystal twist is between  $0.50 \pm 0.3$
  - d) the thickness times the birefringence of the liquid cell being  $0.6 \pm 0.2 \mu\text{m}$ .

13. A single polarizer reflective liquid crystal display comprising

- a) liquid crystal cell with rubbing directions of the top and bottom alignment
- 10 layers that favor a twist angle of  $\pm 143 \pm 5^\circ$ ;
- b) an input polarizer with an angle of  $\pm 40 \pm 5^\circ$ ;
- c) a chiral dopant added to the liquid crystal such that the ratio of the thickness of the cell and the pitch of the liquid crystal twist is between  $0.50 \pm 0.3$
- d) the thickness times the birefringence of the liquid cell being  $0.7 \pm 0.2 \mu\text{m}$ .

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- 14. A liquid crystal displays as claimed in any of claims 1 to 5 further comprising
  - a) a transparent conductive electrode on one side of the liquid crystal cell; and
  - b) a transparent conductive electrode structure on the other side of the liquid crystal cell consisting of a conductive ground plane, an insulation layer on top of
  - 20 such ground plane, and a top conductive electrode patterned into a comb shaped structure.

- 15. A liquid crystal display as claimed in claim 14 wherein said transparent
- 25 <sup>20</sup> conductive electrodes are formed of indium tin oxide.

16. A liquid crystal display as claimed in any of claims 6 to 13 further comprising

a) a transparent conductive electrode on one side of the liquid crystal cell; and

b) a reflective conductive electrode on the other side of the liquid crystal cell consisting of a reflective and conductive ground plane, an insulation layer on top of such ground plane, and a top conductive electrode patterned into a comb shaped structure.

17. A liquid crystal display as claimed in any of claims 6 to 13 further comprising

a) a transparent conductive electrode on one side of the liquid crystal cell;

b) a reflective conductive electrode on the other side of the liquid crystal cell consisting of a reflective coating, a conductive ground plane, an insulation layer on top of such ground plane, and a top conductive electrode patterned into a comb shaped structure.

18. A liquid crystal display as claimed in claim 16 wherein the reflective electrode is made of aluminum.

19. A liquid crystal display as claimed in claims 16 and 17 wherein the comb shaped electrode is made of aluminum.

20. A liquid crystal display as claimed in any of claims 14 to 17 wherein the comb shaped electrode and the top transparent electrode are patterned to form a matrix structure with horizontal and vertical lines.

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